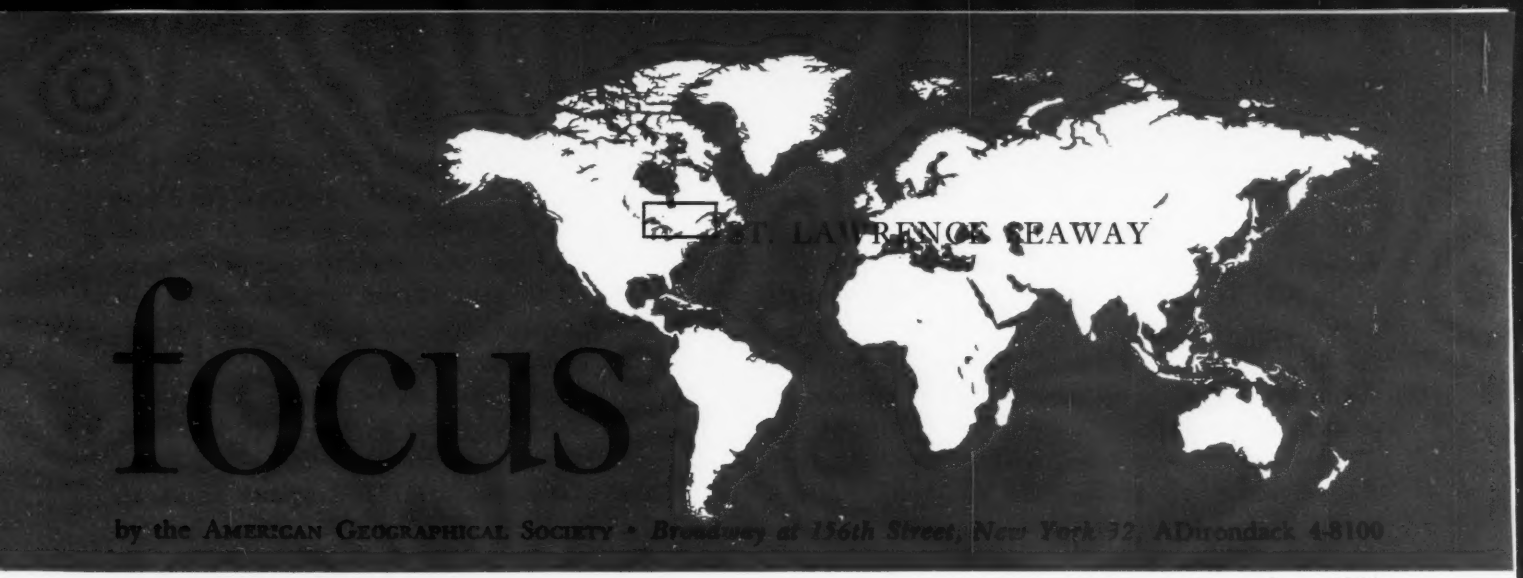

focus

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ALICE TAYLOR, EDITOR

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The St. Lawrence Seaway

Rarely in history have two nations collaborated on a peaceful venture of the magnitude of the St. Lawrence Seaway; and nowhere else in the world has so enormous a concentration of power been created by such collaboration.

As the second navigation season comes to an end, both the Seaway's proponents and its antagonists are somewhat disappointed. Total cargo tonnage has been less than predicted; in fact, in 1959 revenue from tolls was insufficient to meet the repayment schedule. Captains of ocean-going freighters encountered navigation difficulties in the unfamiliar waters; tramps came in from the open sea to join in the scramble for cargo and many left either unladen or semi-laden. The small canallers of the old St. Lawrence canal system continued to dominate traffic, contributing a major share to the numerous bottlenecks. With few exceptions ports were not adequately prepared to handle the increased number of ocean ships.

Too much was expected during these first seasons. Adjustments in shipping patterns are seldom rapid. It was a decade or more before the Panama Canal lived up to expectations. It must be remembered that the St. Lawrence Seaway is just one stage in a process that has been going on for nearly 400 years, since Jacques Cartier was halted in his journey up the St. Lawrence River by the Lachine Rapids opposite Montreal. This process has involved on the one hand the gradual exploitation of physical features of the Great Lakes-St. Lawrence drainage system advantageous to navigation, and on the other, the overcoming of natural obstacles to navigation.

The success of the Seaway must not be judged by the number and size of overseas ships which existing facilities will accommodate. The Seaway was built primarily to move Quebec-Labrador iron ore from the lower St. Lawrence to the Great Lakes in low-cost transportation ore carriers, shallow draught vessels constructed especially for the trade, and to move grain directly from the Great Lakes to lower St. Lawrence ports, thus avoiding one or more transshipments.

The success of the power phase of this great undertaking is already assured. Today the United States and Canada share equally the 1.6 million kilowatts of electricity which are produced in the International Section of the Seaway and used in upper New York State and southern Ontario.

THE PHYSICAL BASIS. The St. Lawrence River in combination with the Gulf of St. Lawrence and the Great Lakes provides a continuous waterway

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into the heart of the North American continent. The distance of penetration into the continent, which is approximately that of the great circle route between western European ports and the estuary of the St. Lawrence, is of the very greatest economic significance because the Great Lakes-St. Lawrence system provides an east-west routeway into one of the richest agricultural and industrial regions on the face of the earth.

The St. Lawrence River is the only completely natural water gap through the mountain and upland barrier formed by the Appalachians and the southeastern upturned edge of the Canadian Shield; yet it has faced competition from Hudson Bay, the Mississippi Valley, the Pacific Ocean-Panama Canal route, and particularly the Lake Erie-Mohawk Valley-Hudson River route. The low-level link between Lake Erie and the port of New York gained the ascendancy over the St. Lawrence route with the completion of a barge canal between Buffalo and Albany in 1823. This ascendancy resulted partly from the fact that it was an "all-American" route between the Middle West and Europe, and partly from a major physical advantage, the year-round, ice-free condition of the port of New York. An eight-month navigation season on the St. Lawrence and the Great Lakes probably militated against the development of their full potential more than any other factor.

Another major limitation of the Great Lakes-St. Lawrence waterway has been, of course, the series of falls, rapids, and shallow connecting channels which abound, especially between Montreal and Lake Huron. The long delay in circumventing these obstacles has not been due to engineering difficulties but rather to the sheer expense involved. Only in recent years when it became feasible to merge the navigation and power schemes did the expense appear not too burdensome, for both Canada and the United States. It is fortunate that the most serious liabilities of the whole Great Lakes-St. Lawrence system are, at the same time, very great assets. The St. Lawrence above Montreal, which over the years has proved the most insuperable obstacle to the improvement of navigation, today provides 3 million kilowatts of electricity, 800,000 to the U.S. and 2.2 million to Canada.

Between the surface of Lake Superior and the lower St. Lawrence there is a total drop of 602 feet. This is concentrated mainly in two sections of the drainage system, 326 feet of it between Lake Erie and Lake Ontario, and 246 feet between the outlet of Lake Ontario and Montreal. In the old International Section, now the main power pool, there was a natural drop of 92 feet in 44 miles, 81 feet of which has been harnessed in the power project. Downstream, between Lake St. Francis and Lake St. Louis, a total drop of 82 feet has been harnessed by the Beauharnois power project.

Because of the great depth of the Great Lakes and their vast surface of 95,000 square miles, an area slightly larger than that of Great Britain, they constitute a tremendous reservoir for the St. Lawrence, providing a remarkably well regulated flow. The maximum average flow is 310,000 cubic feet per second, the minimum 144,000. The variation of about two to one is in striking contrast to the flow of the Columbia River, for instance, with a ratio of 35 to one. Power development and navigation both benefit from this small variation.

EARLY CANALS. It was not until 1855 that a ship drawing as much as eight feet of water could sail from the lower St. Lawrence to Lake Superior. Actually, by this date the eight-foot canal system was already outmoded, primarily due to the arrival of the steamship on the scene. By the latter quarter of the nineteenth century the cry of the Canadian and United States prairie farmers for a cheap grain route to Europe was one that could not be denied.

Soon after the opening of a 14-foot channel, "outmoded" was again the cry. Both the lake ships and ocean ships had grown so rapidly in size with the use of steam and iron that only a small percentage of them could navigate the system. Imagine how pitiful the situation was in 1958, when the 14-foot canal was used for the last time.

The first concrete step toward a deeper channel was taken when in 1895 the United States and Canadian governments appointed a Deep Waterways Commission to report on all possible waterways which might connect the Great Lakes and the Atlantic. The initial report of this Commission was the first of many to favor a deep-water seaway. Almost immediately battle lines were drawn up. The eastern United States railroad management and labor, mine workers, port authorities, private utilities—250 organizations in all—which feared the adverse effects of a seaway and power project, successfully opposed legislation for 59 years. The

Maps drawn by Vincent Kotschar

proponents, namely United States presidents from Wilson to Eisenhower, one Canadian Premier, Great Lakes ports, Middle Western steel interests, and Ontario and New York power authorities were unable to muster sufficient voting strength until May 1954, when the Wiley-Dondero Act became law in the United States. Enactment of legislation in Canada was by then a foregone conclusion.

The main argument for the Seaway was that the St. Lawrence route was the cheapest and most direct between the iron ore deposits of Quebec-Labrador and the hungry furnaces of the Middle West. This route was also less strategically vulnerable than others. The need for a reduction in grain

freight rates was as potent an argument as ever, especially in Canada. It was also claimed that overseas trade would increase tremendously to the benefit of the regions adjacent to the Great Lakes and the St. Lawrence. Finally, the undeniable power shortage in southern Ontario and upper New York strengthened the total seaway argument, and by now, by common assent, the Seaway and power projects were considered indivisible and complementary.

JOURNEY ON THE SEAWAY. The Seaway consists essentially of a 27-foot channel and a system of seven locks, which enable shipping to pass from the St. Lawrence Ship Channel (minimum depth 35 feet) to the deep waters of Lake Ontario, by-passing in turn the Lachine Rapids at Montreal, the Beauharnois Power Dam at Cornwall and its power pool. The seven locks all accommodate vessels up to a maximum length of 730 feet and a beam of 75 feet. Average lockage time is about 35 minutes, with the total running time from the entrance at Montreal to Lake Ontario being about one day and a half.

Ships enter the Seaway at a point immediately downstream from the Jacques Cartier Bridge of Montreal. From this point an 18½-mile long canal swings around the edge of the Laprairie Basin, then cuts over to Lake St. Louis, by-passing the city of Montreal and the Lachine Rapids. The two locks within this section, the St. Lambert and Cote Ste-Catherine, raise shipping 15 and 35 feet respectively.

After crossing Lake St. Louis, shipping is raised 80 feet in two locks to the Beauharnois Power Canal, a feature which today accommodates both the power pool behind the Beauharnois Dam and Seaway shipping.

Ahead lie 16 miles of channel within the canal and 29 across the center of Lake St. Francis to the point where the Seaway reaches the international boundary for the first time. The 47-mile section beyond, to a point close to Prescott, was undoubtedly the key one in the whole project, for it is an international waterway. Negotiation and agreement were necessary before the great power potential could be developed. The tremendous head pond behind the St. Lawrence Power Dam provides an excellent navigable stretch of water, which meant great savings in dredging, excavation, and locks. It is here that the Hydro-Electric Power Commission of Ontario and the Power Authority of the State of New York have developed 1.6 million kilowatts of electricity by using 81 feet of the 92-foot drop between Lake Ontario and Cornwall. Ships gain entrance to the power pool by means of the Eisenhower and Snell Locks, each lifting shipping 40 feet. The final lock is the Iroquois, which is essentially a small control dam.

Two striking results of this development are already visible on the adjacent banks. To the south, Reynolds Metals Company and General Motors have established plants which consume the bulk of the cheap power available on the United States side of the boundary. To the north, 20,000 acres of Canadian territory were lost to the power pool. New planned communities, modern highways, new rail tracks, extensive recreational facilities and scenic drives have taken shape out of Ontario Hydro's relocation and rehabilitation plan.

The Welland Canal was not improved, more the pity, as part of the Seaway project, except for dredging the 25-foot channel to the regulation 27 feet. There are eight locks in the Welland system, three of which are doubled. Due to the long delays here during the 1959 navigation season, the St. Lawrence Seaway Authority of Canada, which now controls the Welland, carried out some improvements during the winter of 1959-1960.

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The improved navigation facilities increased cargo-carrying capacity for ocean-going vessels from 2,500 tons to 8,500, and for lake bulk-type vessels from 6,000 to 25,000. For the privilege of passage through the Seaway, these ships pay 4 cents per ton on gross registered tonnage, plus 40 cents per ton on bulk cargo, and 90 cents per ton on general cargo. For passing through the Welland Canal, they pay 2 cents per gross registered ton, plus 2 cents per ton on bulk cargo, and 5 cents per ton on general cargo. This toll structure contrasts strikingly with that used on the Panama and Suez Canals. Seaway traffic pays according to what is actually earned instead of according to potential earning capacity. This system was adopted as an inducement for ships to use the Seaway and enter the Great Lakes even though partially laden and as a relief to vessels engaged in carrying bulk cargo in one direction only.

THE 1959 SEASON — GROWTH WITHOUT GLAMOR. Although traffic did not come up to expectations in 1959, it did greatly exceed that of earlier years. On the Seaway proper cargo tonnage rose to 20.4 million tons, 75 per cent more than in 1958. On the Welland Canal the tonnage reached 27.4 million tons, or 29 per cent above 1958. Of the 10.9 million tons of upbound cargo on the Seaway, just over 6 million was iron ore; of the 9.5 million tons downbound, almost 6.5 million was grain. On the Welland Canal, iron

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